Siemon Helps SURFsara Lead Scientific Research into the Future

SURF is the collaborative ICT organization for Dutch education and research. It provides scientists, researchers, lecturers and students with access to ultra-modern information and communications technology (ICT) facilities that support the most advanced computing and data-intensive research programs. The organization selected cutting edge cabling solutions from Siemon to support the high-performance computing infrastructure at its new SURFsara data center in the Amsterdam Data Tower.

Amsterdam Data Tower

Within SURF, SURFsara is responsible for providing high-performance ICT infrastructure, expertise and applications to support big data and high-performance computing services, data storage and access for research institutes, national and international universities, and secondary and higher education facilities. Among the institutions using SURFsara's services for data storage are CERN, the European Organization for Nuclear Research, developer of the Large Hadron Collider in Geneva, which is the world's largest and most powerful particle accelerator, and ASTRON, the Netherlands Institute for Radio Astronomy, developer of the Low-Frequency Array (LOFAR) large radio telescope network. The Meertens Institute for the research and study of Dutch language and culture within the Royal Netherlands Academy of Arts and Sciences also uses SURFsara's data center to store and perform analysis of 1.5 million Twitter tweets daily.

The Decision

With this broad and reputable client base heavily relying on high-performance computing capacities, and with research work requiring ever increasing processing power for Big Data generated by the Internet of Things (IoT), a re-evaluation of the data center's IT infrastructure became imminent.

With both the active equipment and the cabling in need of an upgrade, the decision was made to move to an ultra-modern colocation data center facility - the Amsterdam Data Tower, situated on the Amsterdam Science Park. Operated by Digital Realty, the 72-meter-high building offers 5,000 sq. meters of data space and 9 MW of customer power. Today, SURFsara's new high-performance computing data center and the organization's National Super Computer for research occupy two floors within the building.

The Requirements

The move to the Amsterdam Data Tower provided SURFsara with the unique opportunity for IT infrastructure advancements. From a network cabling infrastructure perspective, the organization required a completely new cabling architecture design and high-performance cabling products to create a flexible, scalable and future-proof new data center facility. They found the right partner in Siemon, a global leader specializing in the design and manufacture of high-quality, high-performance IT infrastructure solutions and services who won the tender based on the company's comprehensive data center design expertise and product set that perfectly matched SURFsara's needs.

The Design

Supported by Siemon, SURFsara developed a dedicated structured cabling architecture to serve the data center backbone. They decided to implement an end-of-row configuration for their equipment areas, which places switching in cabinets at the end of each row along with patch panels that mirror the switch ports and corresponding servers throughout the row, allowing any server to be connected to any port of the switch via patch cords for maximum flexibility. This design enables optimized utilization of switch ports and facilitates moves, adds and changes.
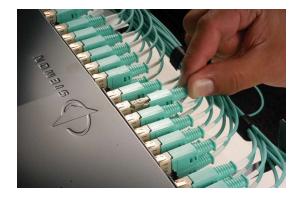
As Freek Dijkstra, group leader infrastructure services networking at SURFsara explains, "In comparison to the point-to-point cabling design that we deployed previously, the new structured cabling architecture provides us with the flexibility that we require for ongoing upgrades and re-configurations, and it easily supports us for the next 15 to 20 years. To keep up with the latest developments we replace our entire IT infrastructure every four to five years and this includes replacement of up to 50 racks a year. The new cabling design provides sufficient flexibility to support this process. All we need to do is reconnect shorter patch cords when there is an active component upgrade."

Nicolas Roussel, technical manager at Siemon who was in charge of this project provided additional advice on fiber polarity to help SURFsara make the right decision on the fiber applications chosen.

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The Solutions Set

With 75 petabytes of incoming and 130 petabytes of outgoing data traffic, plus storage requirements of 47 petabytes, it is a given that computing processes rely on the highest performing cabling solutions. With SURFsara looking for high-density cabling solutions that could easily be combined with non-density solutions, Siemon proposed its LightStack® ultra high-density plug-and-play fiber system and 48-port copper patch panels for the end-of-row cabinet and copper/fiber combo panels in each server cabinet to provide both copper and fiber connectivity to the servers. The modular LightStack design allows SURFsara to expand as they grow, making this modular solution both flexible and cost-effective. In addition, LightStack delivers ultra-high density with up to 144 LC or 864 MTP fibers per rack mount space, and the LightStack modules offer superior low-loss connectivity. SURFsara also utilized Siemon's LC BladePatch® fiber jumpers, with smaller diameter uni-tube duplex cable to reduce cable pathway congestion and an innovative push-pull boot design to control the latch for easy access and removal in tight-fitting areas.

The LC BladePatch jumper also features a latch-only rotation design that allows for easy polarity changes in the field while eliminating potential connector and cable damage. Copper and fiber trunks were installed across all 170 racks on each of the two floors.

"We are an early adopter of emerging Ethernet standards," explains Freek Dijkstra further. "We adopted 40 Gb/s Ethernet five years ago, not only in the backbone but also to the servers, followed by 100 Gb/s to storage end nodes in 2018, while the computing node migrates from 10 Gb/s to 25 Gb/s connections. Plus, we have fiber cabling directly connected to the computers. LightStack's performance capabilities fully meet our standards here."

Expanding the connectivity on a needs basis was another important factor for SURFsara. Because Siemon's LightStack enclosure supports both singlemode and mulitmode multi-fiber MTP adapters and duplex LC modules, it can support high-speed parallel optic applications at 40 and 100 Gb/s or duplex applications at 10 and 25 Gb/s as the needs require. With LightStack, SURFsara was able to take advantage of a modular solution since fiber enclosures can be stacked repeatedly while maintaining full accessibility, which is key in high-density data center environments.

"The modularity aspect of the system is also extremely important to us when we consider different fiber cabling options. LightStack enables us to move from multimode fiber which we use today, to singlemode cabling depending on future capacity demands," Freek Dijkstra adds.

"A major concern amongst end users today surrounds insertion loss," adds Nicolas Roussel of Siemon. "As data centers migrate to higher speeds of 40 or 100 gigabit Ethernet, insertion loss budgets are becoming much more stringent. To ensure application support, we advised SURFsara to deploy our low-loss fiber solutions."

Final Word

One year ahead of celebrating its 30-year anniversary in 2017, SURFsara opened its new data center at the Amsterdam Data Tower. Today, the new facility combines the storage capacity and processing power of around 10,000 modern PCs and Freek Dijkstra sums up the results. "100 Gb/s is our standard today and we are looking to migrate more of our services from 10 to 100Gb/s. Siemon's high-performance cabling solutions have certainly enabled us to achieve this," he says.